PCT/IB 04/05136

Europäisches Patentamt | European Patent Office | Office européen des brevets

REC'D 27 AUG 2004
WIPO PCT

Bescheinigung | Certificate | Attestation

Die angehefteten Unterlagen stimmen mit der ursprünglich eingereichten Fassung der auf dem nächsten Blatt bezeichneten europäischen Patentanmeldung überein.

The attached documents are exact copies of the European patent application described on the following page, as originally filed.

Les documents fixés à cette attestation sont conformes à la version initialement déposée de la demande de brevet européen spécifiée à la page suivante.

Patentanmeldung Nr. | Patent application No. | Demande de brevet n°

03102506.7

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN COMPLIANCE WITH RULE 17.1(a) OR (b)

Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets
p.o.

R C van Dijk

Anmeldung Nr:
Application no.: 03102506.7
Demande no:

Anmeldetag:
Date of filing: 12.08.03
Date de dépôt:

Anmelder/Applicant(s)/Demandeur(s):

Koninklijke Philips Electronics N.V.
Groenewoudseweg 1
5621 BA Eindhoven
PAYS-BAS

Bezeichnung der Erfindung/Title of the invention/Titre de l'invention:
(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.
If no title is shown please refer to the description.
Si aucun titre n'est indiqué se referer à la description.)

Luminaire and method

In Anspruch genommene Priorität(en) / Priority(ies) claimed /Priorité(s) revendiquée(s)
Staat/Tag/Aktenzeichen/State/Date/File no./Pays/Date/Numéro de dépôt:

Internationale Patentklassifikation/International Patent Classification/
Classification internationale des brevets:

F21V11/00

Am Anmeldetag benannte Vertragstaaten/Contracting states designated at date of filing/Etats contractants désignées lors du dépôt:

AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LU MC NL
PT RO SE SI SK TR LI

Luminaire and method

The invention relates to a luminaire suitable for under canopy lighting. The invention further relates to a method of lighting an area under a canopy of a petrol station by means of a luminaire.

A luminaire of this kind is known from US 5,564,820. The luminaire has two opposing sets of strips in its light emission window. When mounted into the false ceiling of or at the ceiling of the canopy of a petrol station, the strips prevent approaching traffic, which faces the strips, to become dazzled by light immediately, without prior reflection, emitted within small angles of up to about 30^0 to the ceiling. The reflector, however, reflects light in both directions transverse to the direction of the traffic also within said angles to illuminate vertical surfaces of the petrol pumps. The reflector may shape a bundle ranging from about 20 to 90^0 to the ceiling, with a maximum at about 55^0. The light emission window is covered by a flat pane. The luminaire shown has a housing and is destined for a single capped lamp.

US 6,254,255 B1 discloses a similar luminaire having a particularly shaped reflector, suitable for petrol station lighting. This luminaire has sets of strips in the light emission window, too. The difference of the intensity of the light bundles in the direction of the traffic, continuous line, and transverse thereto, interrupted line, is shown in Fig. 4 thereof. It is seen that the bat wing shaped transverse bundle reaches at either side up to smaller angles with the ceiling, line 90^0 - 90^0, than the bundle in the direction of the traffic, which bundle has a large cut-off angle. As a result of this large cut-off angle approaching traffic is not dazzled by the light emitted, but isn't able to observe from a large distance either that the petrol station is opened. A double capped lamp is shown in the luminaire. A flat shield closes the light emission window.

Still another luminaire is known from US 6,227,684 B1, which has strips in the light emission window and a flat pane, too. The luminaire is, however designed to produce a light bundle, which is asymmetric in one direction. When mounted near the edge of the ceiling of a petrol station, it is achieved that pumps further remote from that edge are

illuminated, but that substantially no light is emitted towards the road running along the station.

It is a disadvantage of the known luminaires that as a result of the presence of the strips, which create a large cut-off angle downwards from the horizontal to prevent dazzling, it can not be observed from a large distance that a lamp in the luminaires is operated.

It is a first object of the invention to provide a luminaire suitable for under canopy lighting, which upon operation obviates dazzling of oncoming drivers, but nevertheless signals to a relatively large distance that it is operated.

It is a second object of the invention to provide a method of lighting an area under a canopy of a petrol station by means of a luminaire, by which dazzling of oncoming drivers is obviated, but by which it is nevertheless signaled to a relatively large distance that it is operated.

The first object is achieved with the luminaire claimed in claim 1.

The invention will be explained and described with reference to the luminaire being mounted, the light emission window being in a horizontal plane and facing downward.

The strips are necessary for preventing dazzling. The strips at the same time preclude in the known luminaires the emission of light in a small angle with the horizontal which would indicate from the distance that the luminaire is operated. The refracting element of the luminaire of the present invention, present along a first wall does not receive light directly from the lamp, because it is screened by the adjacent strips, nor does it for the same reason receive reflected light from the reflector. However, because the strips are chosen to be light diffusing, the strips adjacent the other first wall, and particularly the one closest to the plane of symmetry, sends diffusely reflected light towards the refracting element. This light is refracted upward. In case the strips were chosen to be specularly reflecting, they would generally reflect light into steeper directions and the reflected light would not or substantially not reach the refracting element.

The diffuse reflection by the strips is of great importance to the homogeneity of the irradiation of the refracting element and thus for the homogeneity of the light emitted thereby, and for dosing the amount of light so as to prevent dazzling.

The strips may be of metal, which is e.g. white coated, e.g. lacquered, or matt to be light diffusing.

The refracting element may be present at the outside of the hood, but it is advantageous if the element is inside the hood. It is then obviated that the element grows filthy, and the hood may have a smooth outer surface, which facilitates its cleaning.

The refracting element may be a separate part, but favorably the element is integral with the at least one first wall. This feature saves assembling costs and, more particularly, prevents loss of light which would otherwise occur at the additional boundaries a separate part would bring about.

It is favorable if the refracting element is composed of a number of refracting subelements, each having a base and a top. This embodiment has several advantages: it takes less material and is slimmer; the hood is lighter; and it allows for the tops of the subelements to have been given different angles for adjusting them to their differing position with respect to the relevant strips. For instance, the subelement which is closest to the light emission window may have a top angle which is e.g. 1^0 smaller than the neighboring one.

It is advantageous, if the luminaire has the feature of claim 5. The bases in this event have a minor effect themselves as only little light will reach them. The planes in which the bases are situated may intersect the strip in a common line, e.g. at half its height.

Favorably, the hood consists of transparent material, for instance of glass or a polymer like polycarbonate or polymethacrylate. More favorably, the luminaire has the feature of claim 6. This feature makes its possible to manufacture the hood in a relatively simple two part mould, because the mould will release the hood when being opened.

In the case a petrol station is accessible to traffic from opposing direction, it is favorable if the luminaire has the feature of claim 7.

In a favorable embodiment the luminaire has the feature of claim 8. The housing protects the luminaire against damage and against the penetration of dust and/or vapor, e.g. petrol vapor.

The reflector may be of specularly reflecting, of semi-specularly reflecting or matt material, e.g. metal, for instance aluminum. The holding means may be designed to hold and to feed a single-capped lamp, such as a lamp having a screw base or a bayonet base. Alternatively, the holding means may be suited to hold a double ended capped lamp, e.g. having R7s caps.

The reflector may be shaped to give a light beam which is symmetrical in the said plane of symmetry, only, or which is also symmetrical in a plane transverse thereto.

In the first event the luminaire is particularly suitable for use near the edge of a canopy, in the other event the luminaire may be mounted between two rows of petrol pumps.

Suitably, a high pressure discharge lamp is used in the luminaire, e.g. a high pressure sodium lamp, but particularly a high pressure metal halide lamp, e.g. a lamp consuming a power of 150 to 250W. Such lamps may have e.g. a ceramic discharge vessel inside a glass, generally a quartz glass outer envelope.

The second object of the invention is achieved in that the luminaire of the invention containing an electric lamp is operated, mounted to the ceiling of a petrol station, the sets of strips being transverse to a direction of traffic.

These and other aspects of the luminaire according to the invention will be apparent from and be elucidated with reference to the drawings, in which

Fig. 1 a cross-section through a central plane of a first embodiment;

Fig. 2 a detail of Fig. 1;

Fig. 3 light intensity-distribution diagrams of the luminaire of Figs. 1 and 2; and

Fig. 4 a cross-section through the plane of symmetry of a second embodiment.

In Fig. 1 the luminaire has a concave reflector 10 with a plane of symmetry 11, which reflector 10 defines a cavity 12. The central plane of the cross-section divides the luminaire in two substantially equal portions. The reflector 10 is of semi-high gloss aluminum, but may alternatively of high-gloss metal or of matt metal, or may alternatively be coated. A light emission window 15 is tangent to the reflector 10, extends transverse to the plane of symmetry 11 and has first edges 16 along the plane of symmetry 11. Holding means 20 are present for accommodating an electric lamp L in the cavity 12 of the reflector 10, with an elongate light source Ls of said lamp L transverse to the plane of symmetry 11. In the Fig. a double-ended metal halide lamp L having a ceramic discharge tube is schematically indicated. A set of strips 25, in the Fig. of white coated aluminum, is mounted adjacent each of the first edges 16. The sets 25 extend substantially from the light emission window 15 into the cavity 12, the strips being light diffusing. The strips create a cut-off angle β in which no light is emitted. A light transmitting hood 30 covers the light emission window 15. The hood 30 has first walls 31 which extend away substantially from the first edges 16, outside the cavity 12. A light refracting element 35 is present along at least one of the first walls 31. The element 35 has a base 36, see Fig. 2, facing the light emission window 15 and a top 37

remote from the light emission window 15. The element 35 is able to cause light to emanate within an angle of up to 5^0 with the plane of the light emission window.

The element 35 is able to do this, although it is completely in the cut-off angle β: the strip 26 at the other side of the plane of symmetry 11 throws diffusely reflected light onto the refracting element 35 and so does to a lesser extent the other strip, because the other strip is able to contribute with its lower end, only.

In Fig. 1 the refracting element 35 is present inside the hood 30. It is integral with the at least one first wall 31. The element 35 is composed of a number of refracting subelements 38, each having a base 39 facing the light emission window 15 and a top 40 remote from the light emission window 15, also refer to Fig. 2. In the embodiment shown, the refracting element 35 has five subelements 38. The top angle diminishes from 15^0 for the angle of the subelement 38 remote from the strip 26 to 11^0 for the angle of the subelement closest to the strip 26. This is because the remote subelement 38 has to deflect light over a larger angle than the closest subelement 38.

The refracting element 35 is at one side of the plane of symmetry 11 and the bases 39 are situated in planes P intersecting a strip 26 of the set of strips 25 which is closest to the refractive element 35 and which is present at another side of the plane of symmetry 11.

The at least one first wall 31 encloses at a surface 32 thereof facing away from the refracting element 35, an angle α with the light emission window 15 in the range of 66 to 74^0. In the Fig.the angle is 70^0.

A similar refracting element 35 is present along the other one of the first walls 31.

The reflector 10 is accommodated in a housing 45. The hood 30 seals the housing 45. The hood 30 is of polycarbonate, but could alternatively be of glass, as the refractive indexes of these materials are about the same. The luminaire is suitable to be used for under canopy lighting of a petrol station.

In Fig. 3 the intensity distribution in the plane of symmetry 11 is shown in a dashed line B, the distribution in the plane of drawing of Fig. 1 in a continuous line A. It is seen, that now a small amount of light is emitted at large angles. I_{87} to I_{90} is about 15 cd/1000lm. The beams B each are able to illuminate petrol pumps of two rows of pumps and the paving between the rows, the luminaire producing the beams being mounted in or at the ceiling in between the rows. The beam A illuminates, as far as the beam is within angles of about 50^0 to the vertical, the paving, and signals to the distance by means of its small lobes at large angles the luminaire is operating and the station is open.

In Fig. 4 a luminaire producing an asymmetric beam is shown. The reference numerals correspond to those of Figs. 1 and 2. The light beam is directed to the right. The luminaire is suitable to be used to illuminate an outermost row of petrol pumps of a series of rows, the left of the luminaire in Fig. 4 being directed to the public road. The plane of drawing in this Fig. coincides with the plane of symmetry 11.

CLAIMS:

1. A luminaire suitable for under canopy lighting, comprising:

- a concave reflector (10) with a plane of symmetry (11) and defining a cavity (12);
- a light emission window (15) tangent to the reflector (10), transverse to the plane of symmetry (11) and having first edges (16) along the plane of symmetry (11);
- holding means (20) for accommodating an electric lamp L in the cavity (12) of the reflector (10), with an elongate light source Ls of said lamp L transverse to the plane of symmetry (11);
- a set of strips (25) adjacent the first edges (16), extending substantially from the light emission window (15) into the cavity (12), the strips being light diffusing;
- a light transmitting hood (30) covering the light emission window (15), the hood (30) having first walls (31) extending away substantially from the first edges (16); and
- a light refracting element (35) along at least one of the first walls (31), the element (35) having a base (36) facing the light emission window (15) and a top (37) remote from the light emission window (15), able to cause light to emanate within an angle of up to 5^0 with the light emission window (15).

2. A luminaire as claimed in claim 1, characterized in that the refracting element (35) is present inside the hood 30.

3. A luminaire as claimed in claim 2, characterized in that the refracting element (35) is integral with the at least one first wall (31).

4. A luminaire as claimed in claim 3, characterized in that the refracting element (35) is composed of a number of refracting subelements (38), each having a base (39) facing the light emission window (15) and a top (40) remote from the light emission window (15).

5. A luminaire as claimed in claim 4, characterized in that the refracting element (35) is at one side of the plane of symmetry (11) and the bases (39)are each situated in a

plane P intersecting a strip (26) of the set of strips (25) which is closest to the refractive element (35) and is present at another side of the plane of symmetry (11).

6. A luminaire as claimed in claim 3, characterized in that the at least one first wall (31) at a surface (32) thereof facing away from the refracting element (35) includes an angle α with the light emission window (15) in the range of 66 to 74^0.

7. A luminaire as claimed in claim 1, characterized in that a similar refracting element (35) is present along the other one of the first walls (31).

8. A luminaire as claimed in claim 1, characterized in that the reflector (10) is accommodated in a housing (45), the hood (30) sealing the housing (45).

9. A method of lighting an area under a canopy of a petrol station by operating an electric lamp in a luminaire
which is mounted to a ceiling of the canopy and
which comprises:

- a concave reflector (10) with a plane of symmetry (11) and defining a cavity (12);
- a light emission window (15) tangent to the reflector (10), transverse to the plane of symmetry (11) and having first edges (16) along the plane of symmetry (11);
- holding means (20) for accommodating an electric lamp L in the cavity (12) of the reflector (10), with an elongate light source Ls of said lamp L transverse to the plane of symmetry (11);
- a set of strips (25) adjacent the first edges (16), extending substantially from the light emission window (15) into the cavity (12), the strips being light diffusing;
- a light transmitting hood (30) covering the light emission window (15), the hood (30) having first walls (31) extending away substantially from the first edges (16); and
- a light refracting element (35) along at least one of the first walls (31), the element (35) having a base (36) facing the light emission window (15) and a top (37) remote from the light emission window (15), able to cause light to emanate within an angle of up to 5^0 with the light emission window (15),

the sets of strips being transverse to a direction of traffic.

ABSTRACT:

The luminaire has a reflector (10) having a light emission window (15), near to first opposed edges (16) of which a respective set of strips (25) is present to create a cut-off angle β. The reflector (10) is closed by a hood (30) which along first walls (31) thereof, which are close to the first edges (16), have refracting elements (35) to cause the luminaire to emit light at small angles with the light emission window (15), within the cut-off angle β. The luminaire is suitable to be used for under canopy lighting of a petrol station and to signal to the distance the station is open, without dazzling oncoming drivers. The method involves the use of the luminaire mounted to the ceiling of the canopy.

Fig. 1

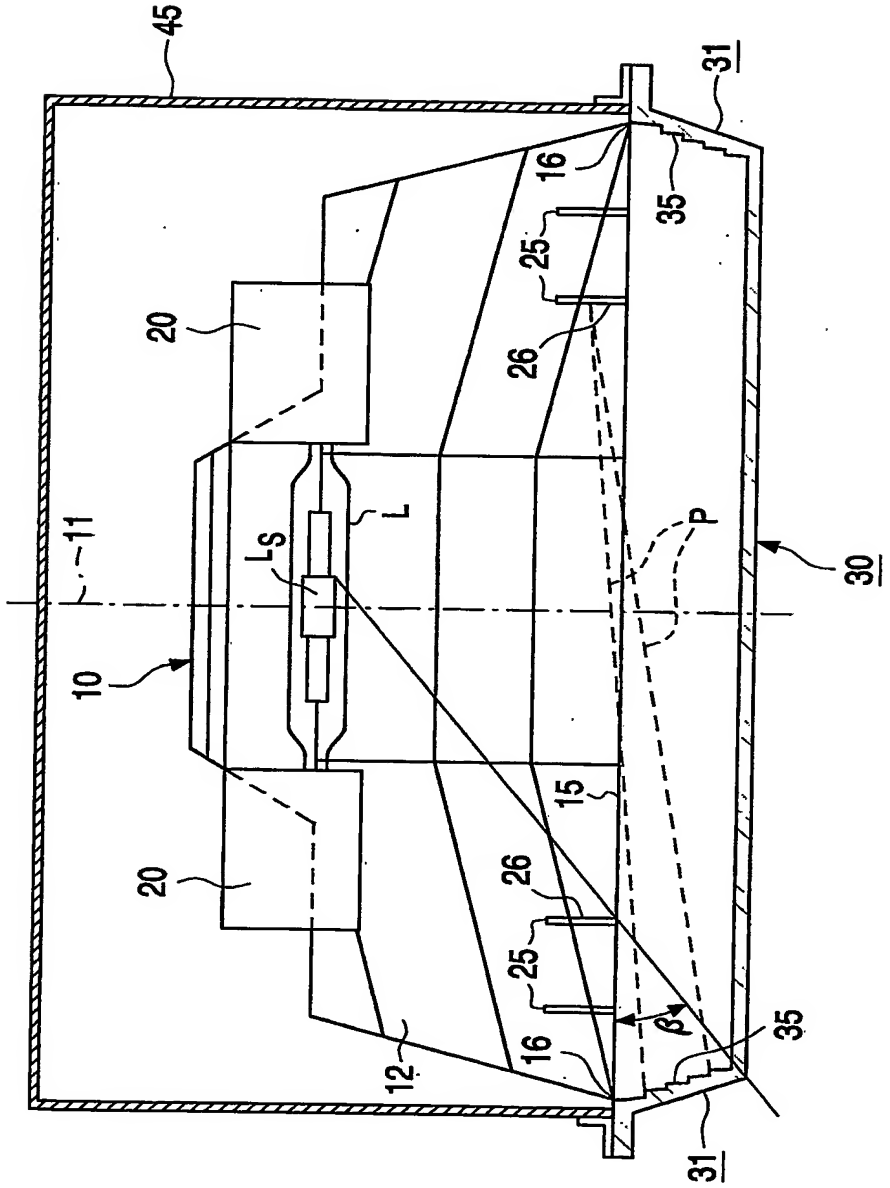

Fig.1

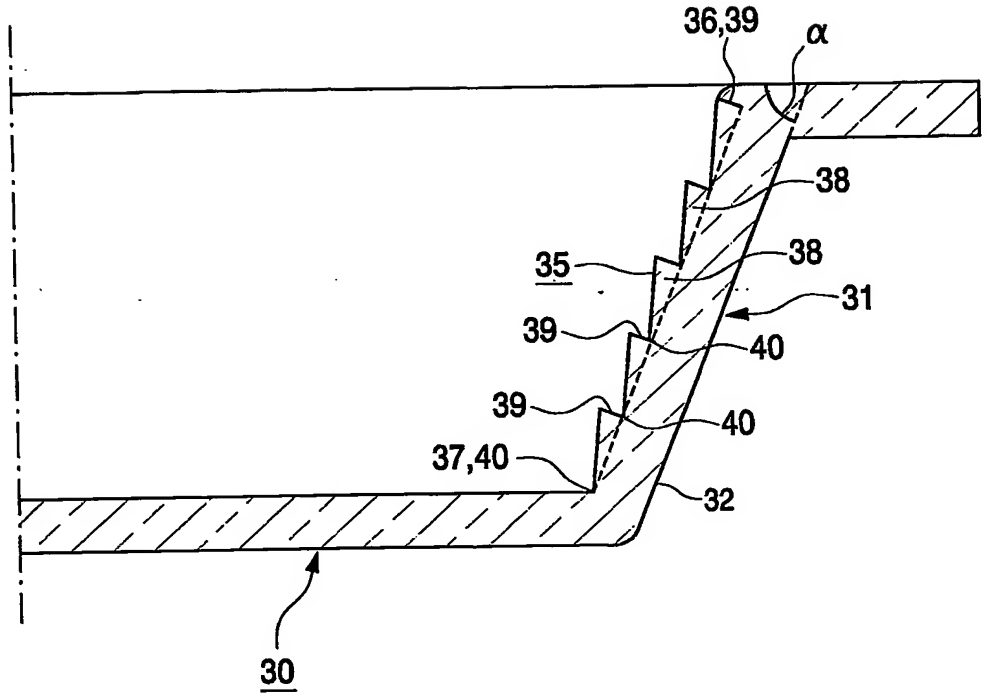

Fig.2

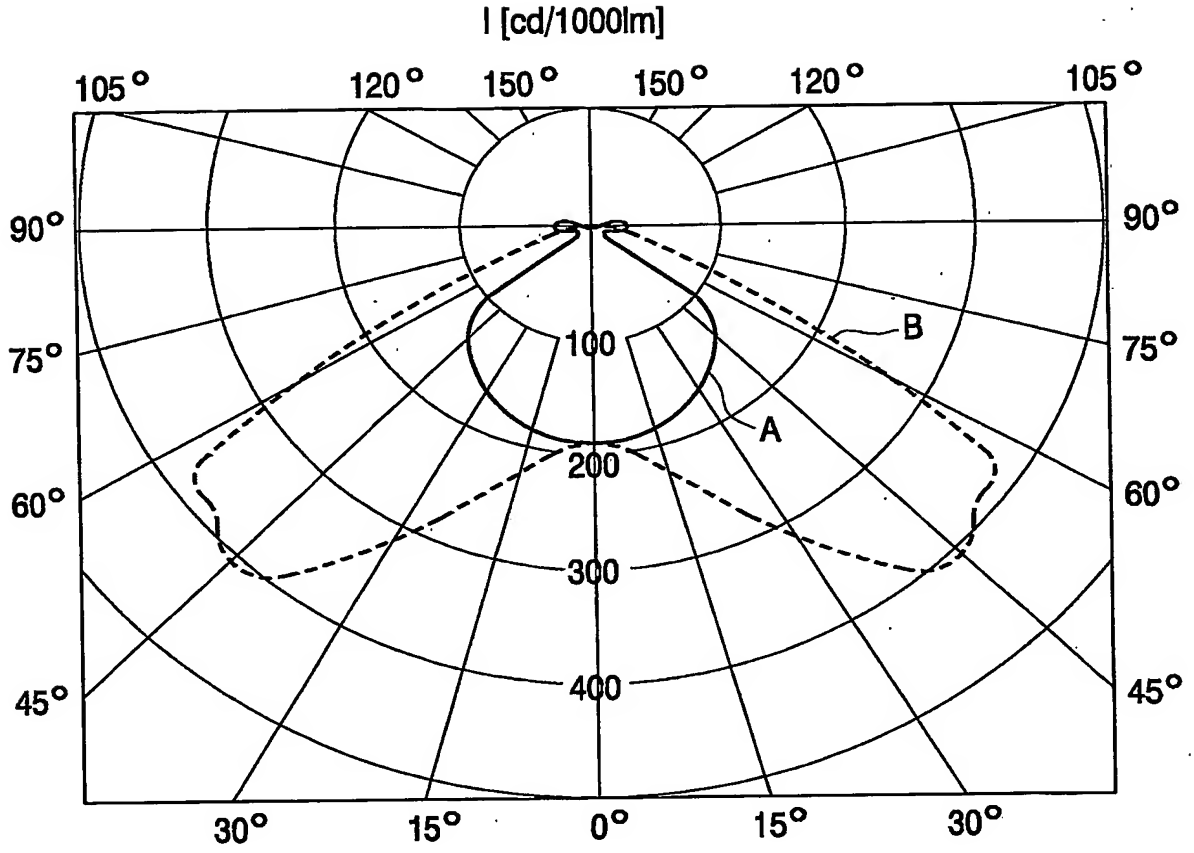
I [cd/1000lm]
105°
120°
150°
150°
120°
105°
90°
75°
60°
45°
100
200
300
400
A
B
30°
15°
0°
15°
30°

Fig.3

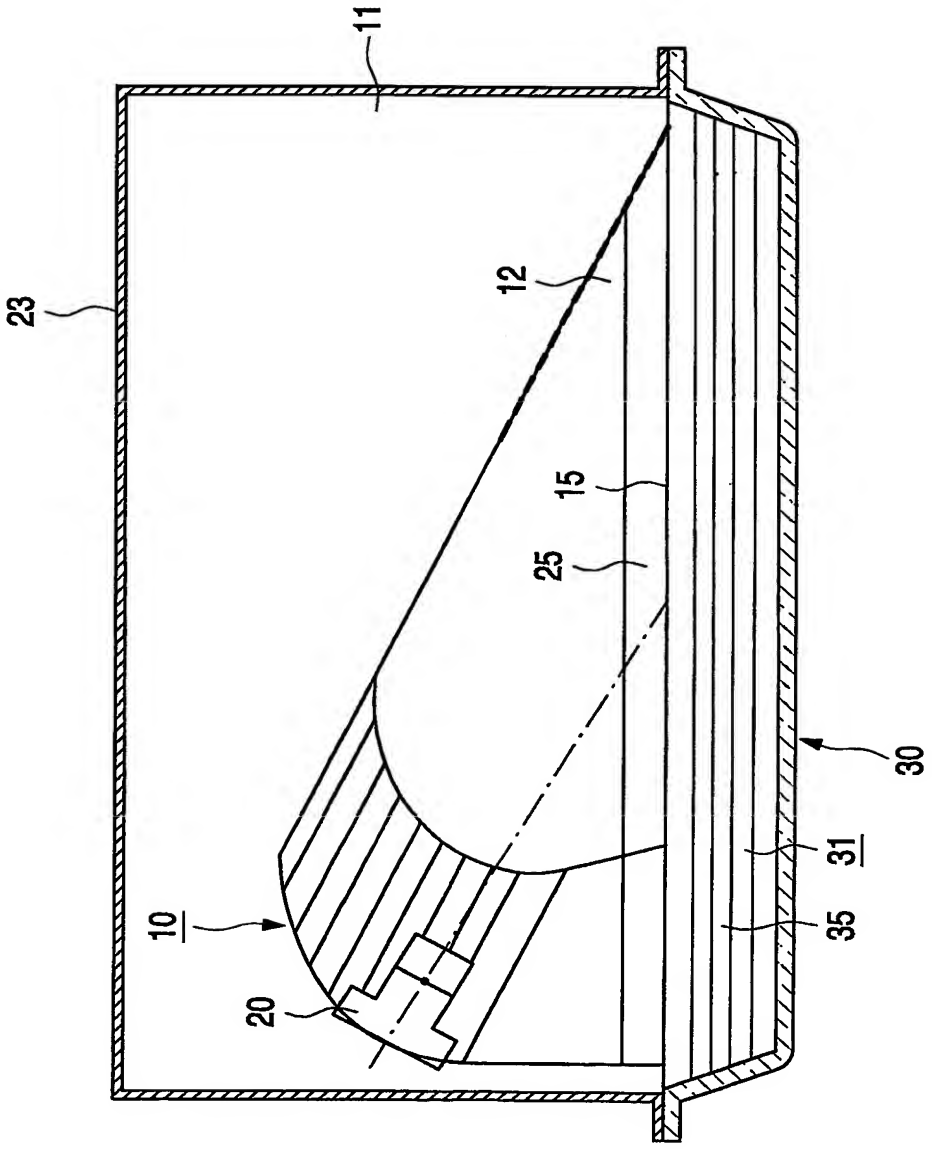

Fig.4